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by Jacob Shapiro

Introduction

"...With all due respect, this is not an accounting. It's a summary accounting. For example, you didn't write any dates, and many of the items are vague. The analysis of the summary shows the following:

1. You received a total of $22,301. Of course, you didn't mention the period over which this sum was received. Our activities only benefited from a negligible portion of the money. This means that you received and distributed the money as you please....

2. Salaries amounted to $10,085—45 percent of the money. I had told you in my fax ...that we've been receiving only half salaries for five months. What is your reaction or response to this?

3. Loans amounted to $2,190. Why did you give out loans? Didn't I give clear orders to Muhammad Saleh to ...refer any loan requests to me? We have already had long discussions on this topic...

4. Why have guesthouse expenses amounted to $1,573 when only Yunis is there, and he can be accommodated without the need for a guesthouse?"

—Ayman Al-Zawahiri, e-mail to Yemeni cell, February 11, 1999.[2]

Standard accounts of terrorist financial and logistical systems stress the efficiency with which terrorist financial networks distribute funds while operating through a variety of covert channels. Because of the covert nature of their work, these networks must operate with fewer checks and balances than most financial organizations require.[3] Indeed, the cellular structure of terrorist networks so often cited in the literature necessarily implies that leaders will be poorly informed about the actions of their subordinates. If we assume that all the members of the network are uniformly committed to the cause and that they all agree on how best to advance the group's political goals, then there is no inconsistency here. However, if leaders, middlemen, and

operational cadres have divergent preferences over spending, then the information asymmetries created by the secretive nature of terrorist networks lead to myriad opportunities for spending money differently than leaders would like.

While, the evidence is mixed regarding disagreements between key terrorist leaders, there is good reason to believe that the preferences of middlemen are not always aligned with those of leaders and operational elements. Mid-level managers of organizations such as Harakat ul-Mujahedin (HUM), a Pakistani militant group focused on Kashmir, often live luxurious lives far beyond what their followers can afford.[4] Captured PLO documents show that those who plan attacks are paid eight times as much as is given to the families of those who die carrying out the attacks.[5] People running criminal fund-raising operations in the United States for Hezbollah drive luxury cars and live in upper-middle class neighborhoods.[6] In 1999, Jemaah Islamiyah (JI) sent an operative to Malaysia and the Philippines to buy guns as part of a plot to kill then Indonesian vice-president Megawati Sukarnoputri. While the operative reported that he couldn't get the weapons back into Indonesia, JI claims he stole the money.[7] During the Christian-Muslim violence in Poso in late 2000, a relatively senior JI member arranged to raise funds from oil company workers to be channeled through one local militia, KOMPAK-Solo, to JI and another local militia, Mujahidin KOMPAK. The workers were so concerned about the probity of these transfers that they appointed an auditor to oversee the funds.[8] Arguments betweens moderates and extremists over strategy frequently occur in organizations contemplating making peace with the government.[9]

This chapter offers a perspective for analyzing such variations in the motivations of terrorists. Terrorist groups face two adverse selection problems. The first is that those likely to survive long in terrorist networks tend to be less ideologically committed as they are less likely to volunteer for the most dangerous missions.[10] The second is that because participation as a financier or logistician is less risky than participating as a local leader or operator, middlemen in terrorist organizations will tend to be less committed.

These two dynamics create problems for leaders. For security reasons, leaders—principals—have to delegate fundraising and financial duties to middlemen—agents. However, the agents can take advantage of the information asymmetries in the network to expropriate some funds. Because the environment is noisy and security concerns prevent perfect monitoring, principals are uncertain whether the agents are passing on all the resources they bring in or are keeping a cut for themselves; a classic moral hazard problem. Leaders can solve this problem by providing enough money to middlemen so that, after the logisticians take their cut, the optimal amount still makes it to the operators. However, doing so is inefficient. Alternatively, leaders can try to reduce inefficiency.

There are at least four inefficiency-reducing solutions to this moral hazard problem. First, leaders can engage in monitoring or auditing of their middlemen. Second, leaders can provide incentive-based compensation, withholding payment for services until they have observed a signal—a successful attack for example—telling them the agent has performed as promised. Third, leaders can engage in punishment strategies when they have evidence of shirking. Fourth, leaders can encourage members to enter into relationships that raise the costs of getting caught expropriating funds.

Unfortunately for the terrorists, each of those strategies creates vulnerabilities. The first two demand that the group conducts additional communications and keep records; both of which violate operational security concerns. The third strategy is risky both because it entails additional communications and because the punished individual may decide to compromise the network.[11] The fourth strategy creates additional interconnections, making the potential costs of any one compromise much greater. Thus given the selection dynamics caused by government strategy, terrorist face an inherent trade-off between security and efficiency.

In order to better flesh out these arguments, the paper proceeds as follows. Section I provides a model of the economics of terrorism and discusses the role of terrorist financial systems. Section II discusses terrorist motivation in more detail and links them to the selection mechanisms. Section III focuses on the principal-agent dilemma in covert organizations. Section IV demonstrates that strategies to ameliorate principal-agent dilemmas create vulnerabilities for terrorist organizations. Section V summarizes the argument and discusses policies to make the security/efficiency trade-off more problematic for terrorist leaders.

I: The Economic System of Terror

This section provides a way of thinking about the strategic decisions of terrorist leaders and the role of financial systems in those decisions. Decisions about spending are best be understood in terms of the trade-off between achieving political impact and the fact that the greater a group's impact, the greater government enforcement efforts. Figure 1 demonstrates the logic.[12] Leadership seeks a level of political impact where the marginal benefits of one more unit of impact matches the marginal costs in terms of government action.

Unlike traditional economic organizations, this optimal point is not always determined by a spending constraint. Terrorist groups rely on five distinct sources of funding:

1. Direct contributions from individuals;
2. Intentional donations from charitable foundations;
3. State sponsorship;
4. Profits from legitimate businesses—including tithing by the membership; and
5. Profits from criminal enterprises—including skimming funds from legitimate organizations and extortion from individuals.

Production decisions, choices about how many attacks to undertake or how much to spend on providing social service, influence the first three sources. In general, the more attacks or social services a group provides, the more funds it can raise from individuals, charities or state sponsors.[13] However, the last two sources enable some groups to produce at this goal-optimal level even if their financial system is inefficient.[14]

Whatever impact the leader desires, the financial system has three basic tasks. First, it must generate resources through fundraising, taxing criminal activities, fraud, or some other source. Second, this value must be preserved and protected from seizure. Finally, the money must be distributed to operational cells. As I show in section III, there are opportunities for middlemen to appropriate resources at each step in this chain. In the next section, we will look at why middlemen are likely to be exactly the type of individuals who would want to do so.

II: Selection Dynamics and Divergent Preferences

One of the most striking patterns to emerge from a close examination of terrorist organizations is that financial network members face dramatically lower risks than local leaders or tactical operatives. Beyond not being asked to participate in risky or inherently fatal ventures, they are less likely to be targeted by government forces. When targeted, they are less likely to be killed. And when arrested, they face more lenient treatment.

Marc Sageman's biographical and network data on participants in the "global Salafi jihad"—Al Qaeda and affiliated organizations—was used to assess the risks of participating at different levels. The data are based on biographical studies of 366 individuals collected from open-source material and include information on when individuals joined, to whom they were connected at that time, their role in the jihad, to whom they were connected after joining, when they left the jihad,

and how they left.[15] According to this data, the rate of death for logisticians has been one third of that for those involved in operational cells for 2001-2003.[16] The capture rate for logisticians has also been lower than that faced by tactical operatives, 2002 being a notable exception. Table 1 provides a summary of survival rates by occupation in the global salafi jihad.[17]

Even when government succeeds in capturing logisticians and other support network members, they face dramatically lower consequences than operators. Of the 29 financiers and logisticians removed from the global salafi jihad between January 2001 and December 2003, only 3 were killed. A particularly telling example is the Jemaah Islamiyah (JI) cell broken up in Singapore in late 2001. The cell provided fund-raising services to JI and was engaged in making logistical arrangements for an Al Qaeda attack in Singapore. Of the 30 plus people arrested, the 13 engaged in direct logistical support each received two years in prison. Those engaged in fund-raising activities were released but not permitted to leave the country.[18]

This section explains why this dramatic difference in risks leads to divergent preferences in terrorist organizations. First, it presents a simple, rationalist model of why people participate in terrorist organizations. Second, it shows how the adverse selection process inherent in terrorist operations leads to divergent preferences. Third, it shows why the process of recruiting new terrorists leads to divergence under a realistic set of assumptions.

The basic framework for this paper is that individuals join terrorist organizations when the utility of doing so is at least as good as that provided by their next best option.[19] Utility is composed of two components. First, individuals get utility out of doing what they believe is right, in this case out of the impact of their actions in furthering the group's goals.[20] Second, individuals get utility out of monetary compensation, their wages. Each individual places a weight on these two components such that the sum of the weights is one. The utility of an action is the probability it yields an impact, *I*, times the weight placed on impact plus the probability it yields wages, W, time the weight placed on wages.[21] We can then describe the population of potential members by the distribution of weights in the population. At the extremes are individuals who are purely motivated by impact, suicide bombers perhaps, and those motivated purely by money.

Within this framework, consider a hierarchical organization where individuals come up through the ranks, starting out in subordinate roles and moving into management roles as local leaders, financial facilitators, or logisticians.[22] Throughout their careers, these individuals will have opportunities to volunteer for risky missions.[23] Those most likely to do so will be those who place the highest weight on impact. Thus, the longer individuals remain in the organization, and the further they move up the management structure, the more likely they are to place a heavy weight on monetary rewards.[24] Of course, there is a countervailing dynamic. Assuming constant wages, those who are less committed will receive lower total utility from participating and will thus be more likely to quit the group.[25] Where the value of participating is only marginally greater than the value of the next best option, quitting should mitigate this particular adverse selection process.

Even without this adverse selection process, there is reason to expect divergence. The lenient treatment observed for support network members means that the threshold level of risk acceptance and commitment required for participation in support activities is much lower than for participation in tactical roles. Recall that there is a distribution of weights in the population of potential members. Thus given set wages for different activities, individuals placing a certain weight on economic considerations might participate in support activities while balking at other roles within the organization. Seeking to maximize operational capability, a rational organization would concentrate such individuals in support roles, freeing up the true believers for riskier operational duties. These personnel decisions would then lead to consistent variance between levels of the organization.

A reasonable objection to the above logic is that groups would not engage in such centrally-directed personnel movements because they create connections between cells. Because of this security consideration, terrorist organizations may actually recruit directly into specific positions with little opportunity for movement. Suppose that the organization in question filled these roles using a strategy of recruitment through existing social ties.[26] Any member tasked with the recruitment and early ideological training of potential members will have access to a limited population. From this population, he will need to fill various spots. If we make the reasonable assumption that belief in a group's ideology follows some bell-shaped distribution--the purely ideological or purely venal types are rarer than those who place moderate weight on both pecuniary rewards and impact—it will be harder for the recruiter to find potential tactical operatives than logisticians. Unless the recruiter knows a surfeit of potential members, he will place individuals in the riskiest position they will accept. Thus individuals will rarely be more ideologically motivated than is necessary given the risk level of their occupation, leading to variance across levels.

A second, more significant objection to the above logic is that if middlemen have scarce skills, their next best option will be much more valuable. Thus their involvement in terrorism may actually suggest they are more committed than the foot soldiers who have no other employment activities.[27] However, evidence from the Kashmiri militant groups suggests this objection may not hold. There, there are numerous reports of middlemen living relatively ostentatious lifestyles.[28] If they were in fact more committed, one would expect them to reserve their wealth for the cause.

Different levels of risks faced by those filling different roles will translate into different preferences within groups under three different sets of assumptions about how terrorist organizations make staffing decisions. The next sub-section looks at how this diversity, combined with the covert nature of terrorist organizations, creates a problem for terrorist leaders.

III: Moral Hazard in Covert Organizations

The relationship between terrorist leaders and their financial networks can be understood in terms of a principal-agent relationship where the principals, terrorist leaders, need to delegate certain tasks—raising funds and distributing them to operational elements—to their agents, the financial network. This delegation entails a risk that if the agents' preferences differ from those of the principal, the agents will not carry out their tasks exactly as the principal would like, they may "shirk". The moral hazard is that the agent can undertake actions that reduce the principal's utility, but the principal can neither perfectly monitor the agent nor can he punish the agent with certainty.[29]

Traditional organizations use three general strategies to deal with this type of problem. First, they audit their employees, accepting monitoring costs to prevent shirking. Second, they create wage schemes that are attractive only to agents whose preferences are aligned with the principals. Third, they provide incentive pay or condition salary on performance. There are many possible screening mechanisms and incentive-based contracts, but all involve making full payment somehow conditional on not deviating too far from the principal's desires.

This section applies this framework to terrorist financial systems. Terrorist leaders are the principals, and the members of the financial network are the agents. First, I describe what information is held by both principals and agents in this game. Second, I describe the private information held by both players. Third, I describe three ways in which this private information creates opportunities for agents to take advantage of the principals.

Both principals and agents hold five pieces of information. Principals know the amount passed to leaders through fundraising activities and each agent knows how much he has passed on.

Likewise, principals know the amount given to financial network members to pass on to operational elements, while each agent only knows how much he was given. Both principals and agents are able to observe the operational impact of their actions. They also share common beliefs about the amount of impact they can achieve given spending levels and the likelihood of achieving that amount. Finally, both are able to observe how risky it is to fulfill certain roles.

There are three critical pieces of information in this game known only to the agents. Only the financiers know the percentage of funds raised that is actually passed up to the leadership.[30] Similarly, only the financiers know the amount passed down to the operational elements. Finally, the principal does not know how much weight the agent places on impact. I assume that impact dominates the leader's decisions, but he is not so myopic as to spend an infinite amount to achieve his ideal level of impact.

Given who knows what, there are three ways financial network members can take advantage of their private information. First, they can misrepresent their preferences over money and impact to pad their salary. Essentially, they can mislead the principal into thinking that he has to offer more compensation than he actually does. This problem will be ameliorated to the extent that there is a market for terrorist financial services.

Second, the agent can appropriate some of the money from fundraising activities. Because the environment is noisy and the network is covert, the leader will be poorly-informed about the actual amount raised. Depending on the leader's beliefs about how accurately he can anticipate fund-raising levels, the agent will be able to get away with appropriating some amount without arousing suspicion. The size of this threshold will depend on the accuracy of the principals' beliefs, which depends in turn on where the funds are coming from. When money from legitimate enterprises is passed through the group to operational cells, the process can be relatively overt. Because the organization is putting good money to ambiguous purposes—at least until the cell commits an attack—the transactions are essentially indistinguishable from legitimate transfers.[31] As such, the principal will be better informed about the likely success of fundraising efforts and the agent will not be able to appropriate as large a percentage. However, when the organization is using money from illicit purposes to fund operations, some kind of laundering will be needed to prevent investigators tracking the original crime from finding out about impending operations. This is a riskier proposition, involving more financial machinations and a greater need for secrecy; hence the principal will be less well informed about his returns to fundraising. As such, the financiers will be able to appropriate a larger percentage without arousing suspicion.[32]

Third, the agent can appropriate money intended for operational cells. Whether these appropriations lead to underfunding of specific operations depends on the nature of the command and control structure.[33] As this book is focused on the role of financial systems, consider the case where the leaders decide on how many attacks to carry out and allocate funds to each attack based on their beliefs about how to equate the marginal returns to impact with marginal costs.[34] Because the principal's ability to observe the impact to cost relationship is imperfect, members of the financial network can skim some of the money intended for operations and blame the low observed impact on the noisy environment.

If opportunities for shirking exist in terrorist organizations, the next question is to ask whether financial agents will take advantage of these opportunities. Consider the case of an agent who is participating because his utility from wages and impact are better than his next best option. This agent knows he can appropriate some funds and get away with it, thereby increasing his utility.[35] Now consider the leader. He has some optimal level of impact that we assume to be below the maximum he could achieve if he spent all his funds.[36] He is uncertain whether he is dealing with a good agent who will pass everything on, or a bad one who will appropriate as much as he can get away with. Since the leader's utility function is heavily weighted towards impact, and since he can spend above the point of diminishing marginal returns, he is willing to provide some extra wages to the agent. He knows the agent will appropriate these funds, but takes the

efficiency loss because the agent will then pass the ideal amount on to the operational group. Thus the leader should pay what he needs to for his optimal impact, plus the minimum amount that can be appropriated without his becoming suspicious. The agent then appropriates this amount and passes the optimal amount of funds on to the operators. The leader remains unable to tell whether he is dealing with a good or a bad agent and the system moves on. In a more formal presentation, this would be the "shirking" equilibrium.

In the terrorist leader's perfect world, where the agents shared his preferences exactly, all the money raised would be passed to the organization and all the money intended for operations would be used as desired. However, selection dynamics mean there is likely to be a difference between the weights placed on impact and wages at different levels of the organization. This difference can lead the agents in the financial network to shirk by appropriating some funds for personal use, introducing inefficiencies into the financial system. In the next section, we will see how a security tradeoff arises from each strategy leaders use to deal with these problems.

IV: Creating Vulnerabilities

Terrorist leaders can undertake a number of strategies to minimize inefficiencies due to shirking, each of which create specific vulnerabilities. This section looks briefly at six of those strategies and discusses the security-efficiency tradeoff in more detail. The first two strategies, auditing and providing funds on a need-to-have basis, apply primarily to the process of moving money to operators. The remaining four strategies apply more generally.

Auditing strategies—apparently employed by Ayman Al`Zawahiri—require the agents to provide periodic, detailed reports on their spending. Such reports provide the leadership with more detailed information about how their money is being spent. This additional information effectively reduces the noisiness of the environment, narrowing the scope of cheating available to the agent. The additional efficiency comes at the cost of additional communications. Because each communication entails a specific risk of compromise, this strategy effectively raises the marginal cost curve, reducing the total impact a group will desire. Thus we should not expect groups who have a surplus of funds to employ such a strategy.[37]

Providing funds only on a need-to-have basis is another way in which principals can inhibit cheating by their agents. By increasing the frequency of transfers and reducing their size, leaders build up better knowledge about the nature of the spending-impact relationship.[38] This reduces the size of expropriations the agents can get away with. Because each additional transfer entails communications, the previous security tradeoff applies and again, leaders who have a surplus of funds are unlikely to employ this strategy.

Punishment strategies depend on the principal's ability to: (1) catch; and (2) credibly punish shirking. As already noted, getting the information needed to increase the probability of catching shirking has a security cost, so the focus here is on the second requirement, credible punishment. Punishment can be as simple as excluding the agent from future transactions. The agent then loses the difference between the future value of participation and that of his second-best option. Where economic opportunity is low, this difference could be quite substantial, so such a strategy may be sufficient. Because such a strategy is built into the shirking equilibrium in section III, the principal may want to use the threat of additional violent punishment, a punitive strategy.

This strategy is harder to implement, because the agent in a covert system holds an inherent threat over the organization. If he is too dissatisfied with his punishment, he can go to the authorities. For example, Jamal Ahmed Al-Fadl who testified in the African Embassy bombing trial had stolen money from Al Qaeda, got caught, went on the run, and approached the U.S. government in an attempt to save himself and his family. Because agents have exactly this option, punitive strategies should only exist where the organization can wield a credible threat of violence

over the agent. Financial agents operating in foreign countries, such as the Yemeni recipient of al-Zawahiri's e-mail, will be less susceptible to this strategy. That agent responded to being called out by quitting the network, illustrating the difficulties transnational groups face in using punishment strategies.[39]

One common way to discourage shirking is to encourage members to enter into trust-inducing relationships such as marriage.[40] The logic is that those who have entered into such relationships will face a larger cost if they are caught cheating. Not only do they lose a future income stream, but familial and community connections as well. Such a strategy is central to the success of the hawala funds transfer system.[41] Of course, if a member embedded in a dense network of strong ties is captured, myriad opportunities for compromise are created. Historically, governments have only worked aggressively through terrorists' non-operational relationships, targeting terrorists' friends and family, when the impact of a terrorist campaign is very large.[42] Thus, rather than raising the marginal cost curve across its entire domain, this strategy increases its slope at high levels of impact. If the cost and benefit curves intersect at low levels of impact, such a strategy may not entail a significant loss in acceptable impact and is likely to be used. If the curves intersect at higher levels of impact, but the slope of the cost curve is small, then increasing its slope can yield a substantial decrease in the equilibrium level of impact. Finally, if the curves intersect at high levels of impact where the slope of the cost curve is already quite steep, then an increase in slope will not greatly decrease the optimal level of impact. Is it worth noting that many groups use this strategy, suggesting two possibilities. First, the curves could intersect for many groups at low levels of impact. This would be consistent with the finding that terrorist groups rarely achieve their avowed political goals.[43] Second, the curves commonly intersect where the marginal cost curve is steep, perhaps where government actions are already starting to bite.

Incentive-base contracts offer another way for principals to reduce shirking. In the terrorism context, such an agreement could entail several different arrangements. One is that payments might be made only after successful attacks or other impact producing activities.[44] Another strategy might entail allowing financiers a set wage once they raise a specific amount. This wage has to be greater than the expected utility of appropriations given the amount raised. Because the appropriation entails some risk of being caught, the incentive can be less than the amount the agent could appropriate. Thus principals should prefer this strategy to overpaying to account for shirking. While these strategies do entail additional communications, they require fewer than the first two strategies. Thus incentive-based contracts raise the cost curve less and should be employed more often.

Finally, terrorist leaders may seek to screen their recruits for ideological purity, to ensure that they all place a very high weight on impact. Some accounts suggest that the training program in Afghanistan served as such a screening process for Al Qaeda.[45] The lengthy ideological debates that form an essential part of the recruiting process in European Islamic ex-patriot communities may also fulfill such a function. While this strategy does not generate additional risks it does reduce the pool of potential participants. For groups recruiting from a limited recruiting population, this may be problematic. Also, the best financiers are unlikely to be religious or ideological purists. Such individuals rarely spend time developing the financial expertise needed to launder money and covertly move funds. This strategy then entails a cost in efficiency, and so may not be preferred to the status-quo. In other words, the efficiency loss from this strategy may drop the feasible level of impact below that which could be achieved with less impact-driven agents.

Of the six strategies outlined above, all entail some cost for the groups. In five of the six, there was a specific security-efficiency tradeoff. Only demanding ideological purity did not have a clear security cost. However, in the realm of terrorist financing the necessary expertise may not be available from highly ideological individuals. Thus that strategy will only be available to some

groups. The next section discusses some specific government strategies that can make the security-efficiency trade-off more problematic for terrorist organizations.

Conclusion

This paper developed a rational-choice perspective on terrorist organizations. In a principal-agent framework, leaders are considered the principals who delegate three-stages of financial activity to agents. Agents raise funds, store them for future use and transfer them to operational elements. Two selection processes cause those agents to have divergent preferences from the principals. First, terrorist organizations face an inherent adverse selection problem because those individuals who are less committed are likely to survive longer and rise into the mid-level positions. Second, because terrorist financiers face significantly lower risks than other members of their organizations, recruiting efforts will place more risk-averse, less committed individuals into financial roles.

Because of the information asymmetries inherent in covert networks, these individuals have opportunities to "shirk" by skimming money at all three stages. So long as terrorist financiers face lower risks than other members of terrorist organizations, these groups will suffer from a moral hazard problem. "Shirking" by the agents creates inefficiencies in the financial system. Like any organization, terrorist groups can use a variety of strategies to control the moral hazard problem. All these strategies come at a cost. In five of six strategies examined, there was a specific security-efficiency tradeoff. Strategies that reduce the moral-hazard problem create vulnerabilities.

Terrorist leaders thus face an unpalatable choice.[46] Where funding constraints do not bite, terrorists can make the tradeoff in favor of security. Where funding constraints do bit, government can undertake some specific actions to make this tradeoff even more problematic. This analysis leads to three distinct recommendations:

First, governments should not publicize the freezing of funds. If funds are frozen without public statement, then financiers must explain how the money was lost. In the framework of section III, the organization will now achieve a lower impact. Seeing this, the principal will suspect the agent of shirking. If the freezing is made public, the agent has an excuse. If it is not, he has two choices: he can make up the frozen amount, or he can get blamed and forego the future value of his relationship with the organization.

Second, government can make engaging in trust-inducing relationships more risky. Publicly targeting relatives and extended families for surveillance would increase terrorists' assessment of the probability that such relationships would lead to compromise. The same end can be achieved by publicizing counter-terror successes based on tracing such relationship.

Third, government may actually reduce tensions in terrorist organizations by engaging in economic development activities. Greater development in recruiting areas effectively increases the value of an individual's second best option, thus the wages required to induce participation will be higher. While this may make recruiting more difficult, the moral hazard problem becomes less problematic from the principals' perspective. Because the difference between the wage they must pay and the feasible expropriations is smaller, the absolute value of the inefficiencies is reduced. Under this scenario, the group is less likely to engage in the inefficiency-reducing strategies that create vulnerabilities, making government's job more difficult. Whether this trade-off—difficulty recruiting but fewer security violations—is favorable to government will depend on local conditions.

Each of these strategies impinges on other areas of counter-terrorism and cuts in several directions. For example, publicizing methods and causes of compromise may aide terrorist's efforts to improve their operational security, but may also prevent them from dealing with

inefficiencies in their financial system. Of course, this dilemma and others discussed above only bite when funds are restricted.

Based on this framework clamping down on finances can have a host of benefits. So long as groups have excess funds, they do not need to face the tradeoffs outlined above. However, when funding becomes scarce, terrorist leaders face a security-efficiency tradeoff. Choosing efficiency-enhancing strategies creates vulnerabilities which government can use. Choosing security means fewer operations, less impact. In either case, government wins when funds are restricted.

About the Author

Jacob Shapiro is a graduate student in political science at Stanford University and a CISAC fellow and research assistant. His research has focused on the role of economic motivations in terrorist organizations. He is currently studying the impact of economic motivations on terrorist organizations' abilities to adapt to and learn from government actions. He received his BA in political science from University of Michigan.

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1. Preliminary working draft, please contact author before citing. The author thanks Marc Sageman for sharing his data on the global Salafi jihad. Ethan Bueno de Mesquita, James Fearon, Jeanne Giraldo, Kelly Greenhill, Stephen Krasner, Charles Perrow, Scott Sagan, Harold Trinkunas, and especially David Siegel provided tremendously helpful comments and criticisms on the underlying logic of the paper. Peter Gausitas, Rebecca Goolsby, Brian Jackson, Gordon McCormick, James Russel, David Tucker, and a number of government officials gave outstanding guidance on the gaps in our understanding of terrorist organizations. All errors are the author's.

2. Alan Cullison, "Inside Al Qaeda's Hard Drive," *The Atlantic Monthly*, September 2004.

3. Although, as the above quote illustrates, some groups do engage in auditing and do find problems.

4. Jessica A. Stern, *Terror in the Name of God: Why Religious Militants Kill* (New York: HarperCollins, 2003).

5. Rachel Ehrenfeld, *Funding Evil: How Terrorism Is Financed and How to Stop It* (Chicago: Bonus Books, 2004).

6. Douglas Farah, *Blood from Stones: The Secret Financial Network of Terror* (New York: Broadway Books, 2004).

7. Maria A. Ressa, *Seeds of Terror* (New York: Free Press, 2003).

8. "Indonesian Backgrounder: Jihad in Central Sulawesi," in *ICG Asia Report* (International Crisis Group, 2004).

9. Ethan Bueno de Mesquita, "Conciliation, Counter-Terrorism, and Patterns of Terrorist Violence: A Comparative Study of Five Cases" (paper presented at the Annual Meeting of the Midwest Political Science Foundation, 2003).

10. I thank Ethan Bueno de Mesquita for pointing this out.

11. Disillusionment with the behavior of more senior members has led to compromise in the past. L'Houssaine Kherchtou testified for the prosecution in the Kenya embassy bombing case because he had seen senior members of the team embezzling funds. Marc Sageman, *Understanding Terror Networks* (Philadelphia: University of Pennsylvania Press, 2004).

12. This analysis was developed independently from Frey and Luechinger (2002) who present a similar argument using supply and demand curves. Their interest is in assessing deterrence strategies in the war on terror. Deterrence is understood as raising the demand curve. For many states, increased deterrence requires increased state centralization, which raises the supply curve because centralized states are more vulnerable. The change in the equilibrium level of terror from efforts to enhance deterrence is thus undetermined. Bruno S. Frey and Simon Luechinger, "Terrorism: Deterrence May Backfire," in *IEER Working Papers* (Zurich: 2002).

13. For example, Palestinian terrorist groups that do not have access to Palestinian Authority funding compete for popular support by committing attacks and contesting responsibility for them. See for example Mia M. Bloom, "Palestinian Suicide Bombing: Public Support, Market Share, and Outbidding," *Political Science Quarterly* 119, no. 1 (2004).

14. On major empirical gap in this field is evidence on the distribution of fundraising sources for major terrorist groups.

15. Sageman uses data on 172 of these individuals in Sageman (2004).

16. Based on Sageman's data on the global Salafi jihad. His data covers most known members of Al Qaeda and directly affiliated groups such as JI.

17. "Survival rates" may be something of a misnomer since the initial population of clandestine participants is, by definition, unknown. Further, the macro trends revealed in this data are suspect as there are several inherent selection biases. First, those members most likely to make it into open-source data are exactly those members who are most well known, and thus the most likely targets for security services. Second, it is impossible to discern whether the dramatic decline in membership revealed in these data is a result of intense government action post-9/11, or of a newfound appreciation for secrecy. However, there is no reason to suspect these biases operate with different intensity across occupations, so we can still use these data to make comparisons about relative riskiness.

18. Ressa, *Seeds of Terror.*

19. All other things being equal, this means that recruitment and retention should be easier in economically disadvantaged areas.

20. This analysis does not deal with the possibility of disagreement over goals. Such disagreement is clearly a source of inefficiency, but it is not clear how disagreements over goals will affect terrorist financing.

21. Formally: and . Note that the probabilities of the payoffs need not sum to one, formally: .

22. This progression need not happen within one organization. For example, much of the leadership in JI have been waging jihad together, at varying levels of intensity, since the mid-1980s. "Jemaah Islamiyah in South East Asia: Damaged but Still Dangerous," in *ICG Asia Report* (International Crisis Group, 2003).

23. Anecdotal evidence from trial transcripts and other sources suggest that volunteerism is a primary method of selection with leaders choosing from among volunteers. See for example *The 9/11 Commission Report: Final Report of the National Commission on the Terrorist Attacks Upon the United States* (Washington, DC: National Commission on the Terrorist Attacks Upon the United States, 2004).

24. Jeremy Weinstein discusses a slightly different adverse selection problem in his work on rebel groups in Sierra Leone. He posits that a wage that brings high quality recruits will also bring in low quality individuals. As leaders are unable to observe the recruits type, they face an adverse selection problem. See for example: Jeremy Weinstein, *Resources and the Information Problem in Rebel Recruitment* (2004).

25. I thank Scott Sagan for pointing this out.

26. Groupe Salafiste pour la Prédication et le Combat (GSPC), an Algerian terrorist organization, uses just such a recruitment system in ex-patriot Algerian communities in France. See Sifaoui's journalistic account of his penetration of a GSPC fund-raising and recruiting cell in Paris. Mohamed Sifaoui, *Inside Al Qaeda: How I Infiltrated the World's Deadliest Terrorist Organization* (New York: Thunder's Mouth Press, 2003).

27. I thank Charles Perrow for pointing out this objection.

28. Stern, *Terror in the Name of God*.

29. For the general development of this problem see David M. Kreps, *A Course in Microeconomic Theory* (Princeton: Princeton University Press, 1990).

30. Relaxing this second assumption entails a security cost, we discuss this in the next section.

31. Donald Masciandaro, *Global Financial Crime: Terrorism, Money Laundering and Offshore Centres* (Hampshire: Ashgate, 2004).

32. One consequence of this argument considered with the selection argument is that financial networks should prefer using illicit channels to raise funds.

33. When support network members set the number and cost of attacks, they choose the most efficient funding level given the funding-success relationship as this is the cheapest way to achieve the threshold level of impact. In other work I consider the relationship between command and control arrangements and funding levels.

34. Al Qaeda reportedly follows a pattern similar to this. See: "National Commission on the Terrorist Attacks Upon the United States," *Staff Statement No. 15: Overview of the Enemy,* (Washington, DC: National Commission on the Terrorist Attacks Upon the United States, 2004).

35. By the selection argument, the individual's weight on wages is likely to be larger than his weight on impact. Even if that condition does not hold, all that is required is that the marginal increase in impact times the weight and probability on impact is less than the marginal increase in wages times the weight and probability on wages.

36. This is where it becomes important that fundraising related to impact is not the sole source of money to many groups of concern.

37. Many observers argue that Al Qaeda no longer exercises the centralized control over finances indicated by the Zawahiri quote. Since Al Qaeda is widely considered to be resource-rich, this change dovetails nicely with the analysis.

38. More opportunities for Bayesian updating. The more such opportunities leaders have, the closer their beliefs come to the true relationship.

39. Cullison, *Op Cit.*

40. For example, JI recruits within existing social networks and encourages intermarriage among members' families. "Al-Qaeda in Southeast Asia: The Case of the Ngruki Network in Indonesia," in *Indonesia Briefing* (International Crisis Group, 2002). See also "Jemaah Islamiyah in South East Asia: Damaged but Still Dangerous."

41. Lisa C. Caroll, "Alternative Remittance Systems," in *FOPAC Bulletin* (Interpol Secretariat, 2002).

42. For example, Osama bin Laden's family has not been aggressively tracked or pursued since 9/11.

43. Sun-Ki Chai, "An Organizational Economics Theory of Antigovernment Violence," *Comparative Politics* 26, no. 1 (1993), 99-100.

44. Al-Aksa Martyr's Brigades for example makes payments to planners and bomb-makers after attacks. Ehrenfeld, *Funding Evil: How Terrorism Is Financed and How to Stop It*.

45. "Testimony of FBI Agent John Anticev on Odeh", *United States of America v. Usama bin Laden, et. al., 5 (7) 98 Cr. 1023*, February 27, 2001, 1630-1638. See also Brian Michael Jenkins, *Countering Al Qaeda* (Santa Monica: RAND, 2002). Groups may also require recruits to demonstrate their commitment by participating in violent actions before they join. See Chai, "An Organizational Economics Theory of Antigovernment Violence."

46. News accounts of Al Qaeda's greater decentralization since the United States began an aggressive world-wide campaign may indicate a choice to trade security for efficiency.